CLAIMS

1. Device for determining and/or monitoring volume, and/or mass, flow of a medium (4) to be measured, flowing through a pipeline (2) in a stream direction (S), comprising: At least one ultrasonic sensor (5, 6), for radiating ultrasonic measuring signals into, and receiving ultrasonic measuring signals from, a pipeline (2); and a control/evaluation unit (11), which determines volume, and/or mass, flow of a medium (4) being measured in a pipeline (2) on the basis of the travel time difference of the ultrasonic measuring signals in, and counter to, the stream direction (S) or on the basis of the Doppler shift of the ultrasonic measuring signals,
characterized in that
the ultrasonic sensor (5,6) has a cup-shape and includes a housing (12) and an oscillatable unit (16) for producing the ultrasonic signals;
the oscillatable unit (16) is composed of a plurality of components (9, 10, 17, 18);
the oscillatable unit (16) is so embodied that it has a node plane (13) arranged essentially perpendicularly to the radiating or receiving direction of the ultrasonic measuring signals; and
at least a portion of an outer surface (14) of the oscillatable unit is connected with the housing (12) in the region of the node plane (13) of the oscillatable unit (16).

2. Device as claimed in claim 1,
characterized in that
the node plane (13) is a plane (14) of symmetry of the oscillatable unit (16).

3. Device as claimed in claim 1 or 2,
characterized in that
a ring-shaped membrane, or diaphragm, (15) is provided in the region of the node plane (13) or the plane (14) of symmetry of the oscillatable unit (16), via which membrane, or diaphragm, the oscillatable unit (16) is connected with the housing (12).

4. Device as claimed in claim 2,
characterized in that
the oscillatable unit (16) includes at least one disc-shaped piezoelectric element (9, 10), a roof element (17) and a floor element (18), the piezoelectric element, or elements, (9, 10) is/are arranged symmetrically to the plane (14) of symmetry and
the roof element (17) and the floor element (18) are arranged symmetrically on both sides of the piezoelectric element, or elements, (9, 10).

5. Device as claimed in claim 4,
characterized in that
the piezoelectric element (9, 10) has a first delimiting surface (19) and a second delimiting surface (20) ,
the floor element (15) is provided parallel to the first delimiting surface (19) and
the roof element (14) is provided parallel to the second delimiting surface (20).

6. Device as claimed in claim 5,
characterized in that,
in a predetermined region of the two delimiting surfaces (19, 20) of the piezoelectric element (9, 10), electrodes (21, 22) are provided, via which the piezoelectric element, respectively the oscillatable unit (13; 9, 10), is excited to oscillate.

7. Device as claimed in claim 4,
characterized in that,
between the electrode (21) on the first delimiting surface (19) and the floor element (18) and the electrode (22) on the second delimiting surface (20) and the roof element (17), in each case, a dielectric insulating layer (24, 25) is provided.

8. Device as claimed in claim 4, 5, 6 or 7,
characterized in that,
in an edge region of the oscillatable unit (16), a ring-shaped chamber (23) is provided.

9. Device as claimed in claim 4, 5 or 7,
characterized in that,
in a housing chamber (26) located above the roof element (17), a potting compound (27) is provided.

10. Device as claimed in claim 9,
characterized in that
the potting compound (27) is a silicone potting compound.

11. Device as claimed in claim 1 or 2,
characterized in that
the oscillatable unit (16) is so embodied that it is adaptable to different media (4) to be measured.

12. Device as claimed in claim 11,
characterized in that
the roof element (17) is exchangeable and
roof elements (17) of different thicknesses and/or different densities are provided, which are exchangeable as a function of the particular medium (4) to be measured and which are intergratable into the oscillatable unit (16).

13. Device as claimed in claim 11,
characterized in that
exchangeable fill media (28) of different densities are provided, which are arrangeable in the housing chamber (26) above the roof element (17) as a function of the particular medium (4) to be measured.